Hope for Whom?
Financial Aid for the Middle Class and Its Impact on College Attendance

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First Version: April 1999
This Version: July 1999

Abstract

The federal government and the states have recently enacted a slew of aid policies aimed at college students from middle- and high-income families. There is little evidence on the sensitivity of this group's schooling to college costs. I estimate the impact of aid on the college attendance of middle- and upper-income youth by evaluating Georgia's HOPE Scholarship, the inspiration of the new federal Hope Scholarship. The results suggest that Georgia's program has had a surprisingly large impact on the college attendance rate of middle- and high-income youth. Using a set of nearby states as a control group, I find that Georgia's program has likely increased the college attendance rate of 18- to 19-year-olds by 7.5 to 8.3 percentage points. Among the subset of youth most likely eligible for Georgia HOPE, attendance has risen 10.9 percentage points. The results suggest that $1,000 in aid increases the college attendance rate of upper-income youth by 3.9 to 5.7 percentage points. Georgia's program has widened the gap in college attendance between blacks and whites and between those from low- and high-income families. The federal Hope Scholarship, which focuses on the same slice of the family income distribution as Georgia's program, is also likely to exacerbate the already large racial and income gaps in college attendance.

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*Comments are welcome: e-mail Susan_Dynarski@Harvard.Edu. I thank Daron Acemoglu, David Autor, Amy Finkelstein, Tom Kane, Steve Pischke and participants at the MIT Labor and Public Finance lunches for their helpful comments. I especially thank Josh Angrist, Jon Gruber and Jim Poterba for their guidance. Support from NBER Aging and Health Pre-Doctoral and Post-Doctoral Fellowships is gratefully acknowledged.

I. Introduction

Federal and state governments have recently ushered in a new generation of student aid policies. New York and New Hampshire, for example, now have tax-free college savings plans. On the federal level, the new Education IRA allows families to put after-tax dollars into college savings and accumulate interest tax-free. Georgia provides merit-based scholarships that make college free for thousands of residents; more than a dozen states are considering programs that imitate Georgia's. Several states have introduced tuition tax credits, while the largest new aid program, the federal Hope Scholarship, allows families of college students a tax credit of up to $1,500 a year. It is anticipated that each year students will receive a total of $7.5 billion through the federal education tax credits, making them the largest source of federal subsidies for college students.[1]

These new programs differ from traditional student aid in one crucial dimension: they are not need-based. Historically, government aid for college has been strongly focused on low-income students. Eligibility for the two largest federal aid programs, the Pell Grant and Stafford Loan, is determined by a complex formula that defines financial need on the basis of income, assets and family size. The formula is quite progressive: 90 percent of dependent students who receive federal grants grew up in families with incomes less than $40,000.[2]

By contrast, the new aid programs are aimed squarely at middle-and upper-income families. Tax-deferred savings plans such as the Education IRA are most valuable to the families that face the highest marginal tax rates. The federal Hope Scholarship is particularly focused on middle- and upper-income families. The income cutoffs for the Hope Scholarship are set high enough that less than ten percent of

[1] The federal loan programs deliver $30 billion a year to students. But since loans are eventually paid back they ultimately constitute a smaller revenue outlay than the new tax credits.

[2] Calculated from Table 314 in National Center for Education Statistics (1998).

filing households exceeds them.[3] Since the credit is offset by any need-based aid received, a student who is poor enough to receive the maximum Pell Grant is ineligible for the Hope Scholarship. The credit is also non-refundable, making it inaccessible to families too poor to pay taxes. Georgia's program is similarly focused on middle- and high-income students: there is no income cap on participation and it too is closed to students who receive substantial aid from other sources.

How will this new breed of student aid affect college attendance rates? Will aid to middle- and high-income families actually increase college attendance, or are the new programs simply transfers to infra-marginal students? We have little evidence with which to answer these questions. There is scant research concerning the impact of tuition subsidies on middle- and upper-income youth, for the simple reason that most existing aid programs focus on needy students. History has therefore provided few experiments that would allow us to measure the responsiveness to aid of middle- and upper-income youth. There are reasons to suspect that low- and upper-income youth respond differently to aid: wealth, parental education and academic preparedness are all tightly correlated with income and each have their own impact on the decision to attend college. And as I will show later in the paper, a fairly simple model of human capital investment predicts that the effect of aid on schooling decisions will vary by parental income.

In this paper, I estimate the impact of aid on the college attendance of middle- and upper-income students by evaluating the program that is the namesake and inspiration of the federal Hope Scholarship: the Georgia HOPE (Helping Outstanding Pupils Educationally) Scholarship. In 1993, Georgia initiated HOPE, which is funded by a state lottery. The program allows free attendance at Georgia's public

[3]The income cap is set at an adjusted gross income of $100,000 for married-couple families and $50,000 for single filers. Early analysis of 1997 tax returns indicates that 7.4 percent of household tax returns fell above these income cutoffs; this estimate is expected to rise somewhat as late returns are tabulated (Hollenbeck and Kahn, 1998).

colleges for state residents with at least a B average in high school.[4] More than a dozen states are weighing the introduction of merit scholarships like Georgia's; governors in Alabama and South Carolina were elected in 1998 on the basis of pledges that they would initiate lotteries to fund education in their own states (Selingo, 1999). Despite the widespread attention paid Georgia's HOPE Scholarship, there has been no rigorous evaluation of its impact upon college attendance.[5] Do programs such as Georgia's HOPE actually increase college enrollment? Or do they simply transfer funds to families who would have sent their children to college anyway?

I use data from the Current Population Survey to evaluate the impact of Georgia's HOPE Scholarship on college attendance. Using a set of nearby states as a control group, I find that Georgia's program has likely increased college attendance rates among all 18- to 19-year-olds by 7.5 to 8.3 percentage points. I obtain similar results using a within-state control group to estimate the program's effect. Among the subset of youth that is most likely eligible for Georgia HOPE, I find the attendance rate has risen 10.9 percentage points relative to that of a similar population in nearby states. I further find that the increase is concentrated among Georgia's white students, who have experienced a 12.3 percentage point rise in their enrollment rate relative to whites in nearby states. The black enrollment rate in Georgia appears unaffected by HOPE. The differential impact of HOPE on blacks and whites is likely due to the focus of HOPE on middle- and upper-income students who perform well in high school.

The results suggest that for each $1,000 of subsidy the college attendance rate of middle- and upper-income youth rises by four to six percentage points. This is a surprisingly large response: the estimate is of the same order of magnitude as those reported by studies that examine the effect of aid on

[4] The federal Hope Scholarship in its proposed form also required minimum grades in high school, but this provision was dropped over concerns about the cost and propriety of having the Internal Revenue Service gather high school transcripts.

[5] The Council for School Performance of Georgia State University has conducted a number of studies of HOPE. These studies contrast the academic performance of HOPE recipients with that of college students who don't get HOPE. Since HOPE scholars are selected on the basis of academic merit, these studies do not provide a valid test of HOPE's impact.

low-income students. The results should be extrapolated to other states and programs with caution. Georgia had attendance rates well below the national average before HOPE was introduced, and it is possible that a similar program in a high-attendance state such as Massachusetts would not have a similar impact. Further, Georgia's program was unusual in its simplicity, scale and publicity. A less transparent form of subsidy – such as a tuition tax credit or tax-free interest on college savings – may not produce responses of similar magnitude.

The paper is organized as follows. Section II provides a short overview of the literature on the effect of subsidies on college enrollment and offers a theoretical motivation for why we might suspect that the effect of a subsidy varies with family income. Section III discusses Georgia's program in detail. Section IV explains the empirical methodology and data used in the analysis. Section V presents results. Section VI explores the policy implications of the paper's findings and Section VII concludes.

II. Background and Literature Review

A long literature attempts to identify the effect of aid on college attendance. Leslie and Brinkman (1988) review studies whose estimates indicate that $1,000 in aid increases college attendance rates by three to five percentage points. The effect of aid on college attendance is generally poorly identified in these studies. Identification is an important consideration in this context, because aid is correlated with many observable and unobservable characteristics that have their own influence on education. Dynarski (1999) reviews a handful of well-identified studies that use a discrete shift in aid policy as a source of exogenous variation in aid. The findings of Angrist (1993), Kane (1994) and Reyes (1995) fall within the range of estimates in the Leslie and Brinkman review: $1,000 in aid is found to increase college attendance by about four percentage points. Dynarski (1999) exploits variation produced by the elimination in the early 1980s of the Social Security Student Benefit Program, which annually provided aid to nearly one million college students. She finds that $1,000 in aid increases college attendance by five percentage points.

None of these studies, however, focuses on the effect of subsidies on middle- and upper-income students.[6] A recent study by Kane (1999b) focuses most closely on the question posed by this paper. Kane uses longitudinal data to examine how the effect of public tuition on college attendance varies by family income. Exploiting variation in tuition across and within states, Kane finds that a $1,000 drop in tuition increases the attendance rate of lower-income youth 5.2 percentage points more than it does that of middle- and upper-income youth.

Modeling the Relationship between Aid, Income and Schooling

In this section, I develop a simple model of schooling investment that provides insight into why the effect of aid on schooling may vary by income. The key assumption of the model is that the level of debt that a college student must assume for an additional year of schooling is a decreasing function of his family's income. Higher levels of debt lead to higher interest payments, which increase the college costs of low-income students relative to those of high-income students. By reducing both the present price of college and the level of debt on which interest is paid, aid increases the optimal level of schooling. Aid's effect on schooling decisions is predicted to drop or remain constant as income rises; which of these predictions holds depends on whether marginal interest rates rise or remain constant as the level of debt increases. The rest of this section lays out the detail and discusses the implications of the model.

Earnings are assumed to be an increasing, concave function of schooling:

$$(1) \quad y(S) = \alpha + \beta S - \delta S^2$$

In this equation, S is years of schooling, $y(S)$ is earnings and both β and δ are positive.

[6] Reyes (1995) examines the effect of subsidized loans on middle- and upper income students, but her estimate will not inform us of the effect of grant aid if youth are debt-averse or do not fully recognize the subsidy value of a low-interest loan.

Differentiating Equation (1) with respect to schooling yields the marginal benefit of a year of schooling:

$$(2) \quad MB = y'(S) = \beta - 2\delta S$$

The marginal cost of schooling consists of a year's tuition less any student aid, interest charged on any borrowing and an individual-specific parameter that reflects heterogeneity in the ease with which an additional year of school is completed:

$$(3) \quad MC = p(1-A) + R(B) + \gamma_i$$

Here, p is annual tuition, A is the percentage of annual tuition that is offset by student aid. γ_i is the individual-specific, non-financial cost of college. For example, γ_i may reflect academic preparation for college-level work. $R(B)$ is total interest rate paid when borrowing amount B. I will discuss the characteristics of the $R(B)$ function shortly.

A student's borrowing is determined by the price of college, living expenses, the amount of aid, and the amount that his family can contribute to his education. Parents devote a fixed proportion of income, α, to their child's education. The amount borrowed is then:

$$(4) \quad B = p(1-A) + C - \alpha Y$$

Here, Y is parental income and C is living expenses other than tuition.[7] A positive value of B indicates a student who borrows for college, while a negative value indicates a combination of prices, family income and aid that allows a family to forego borrowing and instead save.

[7] Note that living expenses affect the level of debt but do not directly enter the marginal cost equation. This is because living expenses are incurred whether or not an individual attends college, and so are not considered a marginal cost of attending college. However, interest is paid in order to fund living expenses only if a person attends college and so constitutes a marginal cost of schooling.

Setting equal the marginal benefit and cost of college, solving for S and taking the derivative of schooling with respect to aid yields:

$$(5) \quad \frac{dS}{dA} = \frac{p + pR'(B)}{2\delta}$$

This term is unambiguously positive: aid increased schooling. The effect of aid works through two channels, which I will refer to as the price effect and the liquidity effect. The price effect of aid is represented by the first term in the numerator: aid reduces the price of a year of college and thereby increases demand for schooling. The liquidity effect is represented by the second term: aid reduces borrowing and total interest paid and thereby increases the impact of aid on schooling decisions. Both of these effects are scaled by the δ term, which represents the rate at which the return to schooling drops as the level of schooling rises. If returns drop quickly (that is, δ is large), then schooling choice will be relatively insensitive to aid. Conversely, if returns drop slowly then aid will have a relatively large effect on schooling choices.

We are interested in how the response of schooling choice to aid varies by family income. Taking the derivative of Equation (5) with respect to income yields

$$(6) \quad \frac{d^2S}{dAdY} = -\frac{\alpha p}{2\delta}[R''(B)]$$

The sign of this term depends on the shape of the interest function, $R(B)$. Recall that $R(B)$ is the total interest that is paid when borrowing amount B. If $R''(B) > 0$, then Equation (7) is negative, implying that the effect of aid decreases as income rises. $R''(B)$ is positive if students face marginal interest rates that rise with borrowing.

There is evidence that students and families face rising interest rates when borrowing for college.[8] The cheapest source of funds for most families is federally subsidized student loans: the interest rate is about seven percent, and the government pays all interest while the student is in school. For a student

[8] This paragraph draws on Kane (1999b).

borrowing the maximum of $17,125 and repaying over ten years, a loan with a nominal rate of seven percent and an in-school interest subsidy is equivalent to a standard loan with a nominal rate of 4.5 percent.[9] For most families, housing equity is the next cheapest source of funds.[10] Current mortgage rates are about seven percent; the preferential tax treatment of mortgage interest implies an effective rate of five percent for those in the 28 percent tax bracket. If housing equity has been exhausted, families can turn to unsubsidized federal loans, which charge a rate of seven to eight percent but require that interest be paid while the student is in school. As a last resort, families can turn to more expensive sources of funds, such as unsecured personal loans, retirement savings and credit cards. It is plausible, then, that students face interest rates that rise with their borrowing. Equation (6), in this case, predicts that the effect of aid on schooling will diminish as income rises.

The effect of aid does not vary by income if interest rates remain constant as the level of borrowing rises. In this case, Equation (6) is equal to zero. The effect of aid will actually increase with income if marginal rates decline with the level of borrowing, but I ignore this case since such a pattern of interest rates is implausible. The model therefore predicts that, for each individual, the effect of aid either drops or remains constant as income rises.

However, as I will explain with an example, Equation (6) does not unambiguously predict that at least as large a share of low-income youth as high-income youth will be induced to attend college by a given subsidy.[11] Say that the individual-specific, non-financial cost of schooling (g_i) is identically and

[9] As of 1998, borrowers can deduct $1,000 a year in loan interest from taxable income if their adjustable gross income falls below $40,000 (single taxpayers) or $60,000 (married taxpayers). This further increases the subsidy value of federal loans.

[10] Housing equity is the cheapest source of capital for high-income families because of their high marginal tax rates. Those from the highest-income families are not eligible for subsidized loans.

[11] Thanks to David Autor for drawing this to my attention. Stanley (1999) discusses this point in the context of the G.I. Bill, which he finds had its largest impact on the schooling of veterans who grew up in families of high socioeconomic status.

normally distributed within the low-income and high-income populations.[12] The college attendance margin will cut at a higher point in the g_i distribution among high-income youth than it will among low-income youth. This is because, among high-income youth, the reduced level of debt (and therefore interest payments) that their parents' financial contribution to their schooling allows can offset relatively high non-financial costs of college.[13]

How does this affect our parameter of interest, the relative shares of high- and low-income youth induced by a subsidy to attend college? The share of an income group that is pushed over the college attendance margin is a function not only of the sensitivity of its members to aid but also the proportion of its members near the margin of college attendance. If the distribution of g_i is normal (or, more generally, non-uniform) it is ambiguous whether the share that is close to the margin of attendance is larger among low- or high-income youth. For example, the college attendance margin among high-income youth might appear at the mean of the g_i distribution, where the largest share of the group is concentrated. The college attendance margin among low-income youth will then appear below the mean of the g_i distribution, where a smaller share of the group is concentrated. In this case, a given subsidy could easily push into college a larger share of high-income youth than low-income youth. It is obviously simple to construct a scenario in which the opposite is true. The effect of aid on the schooling decisions of middle- and high-income youth must therefore be determined empirically, rather than extrapolated from aid's effect on low-income youth. In the next section, I discuss the policy experiment that will be used to estimate the impact of aid on the college attendance rates of upper-income youth.

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[12] Normalcy is not required here; any non-uniform distribution will produce the same conclusion.

[13] Ellwood and Kane (1999) show that even after controlling for test scores (a measure of the non-financial costs of schooling, g_i) low-income students are less likely to go to college than high-income students. This is evidence that the college attendance margin cuts at a higher point in the g_i distribution of high-income youth than low-income youth. The same paper also shows that high-income families contribute more money to their children's education than low-income families. The greater level of financial aid received by low-income students does not offset this differential in the levels of parental contributions.

III. Georgia's HOPE Scholarship

In 1991, Georgia Governor Zell Miller requested that the state's General Assembly consider the establishment of a state-run lottery, with the proceeds to be devoted to education. The Georgia General Assembly passed lottery-enabling legislation during its 1992 session and forwarded the issue to voters, who approved the required amendment to the state's constitution in November of 1992. The first lottery tickets were sold in June of 1993. $2.5 billion in lottery revenue has flowed into Georgia's educational institutions since 1993. The legislation and amendment enabling the lottery specified that the new funds were not to crowd out spending from traditional sources. While it is not possible to establish conclusively that such crowd-out has not occurred, spending on education has risen substantially since the lottery was initiated, both in absolute dollars and as a share of total state spending. Roughly equal shares of lottery funds have gone to four programs: the HOPE Scholarship, educational technology for primary and secondary schools, a new pre-kindergarten program, and school construction.

Residents who have graduated since 1993 from Georgia high schools with at least a 3.0 grade point average (GPA) are eligible for HOPE.[14] The first scholarships were disbursed in the fall of 1993. Participation in HOPE during its first year was limited to those with family incomes below $66,000; the income cap was raised to $100,000 in 1994 and eliminated in 1995. HOPE pays for tuition and required fees at Georgia's public colleges and universities. Those attending private colleges are eligible for an annual grant, which was $500 in 1993 and had increased to $3,000 by 1996. These amounts are offset by other sources of aid. A student who receives the maximum Pell Grant gets no Hope Scholarship but

[14] The high school GPA requirement is waived for those enrolled in certificate programs at technical institutes. For high school seniors graduating after 2000, only courses in English, math, social studies, science and foreign languages will count toward the GPA requirement. More than 40 percent of those who currently receive the HOPE Scholarship would be ineligible under this definition.

receives a yearly book allowance of $400.[15] A $500 education voucher is available to those who complete a General Education Diploma (GED). Public college students must maintain a GPA of 3.0 to keep the scholarship; a similar requirement was introduced for private school students in 1996.

Georgia education officials were concerned that students would forego applying for federal aid once the HOPE Scholarship was available and have created an application process designed to prevent this outcome. Those from families with incomes lower than $50,000 must complete the Free Application for Federal Student Aid (FAFSA) in order to apply for HOPE. The four-page FAFSA requests detailed income, expense, asset and tax data from the family. Those with family incomes above $50,000 fill out a short, one-page form that requires no information about finances other than a confirmation that family income is indeed above the cutoff. The rationale for the $50,000 income threshold is that few students above that cutoff are eligible for need-based federal aid.[16]

HOPE has been deemed a success by Georgia politicians and has received widespread attention from the national media. Large increases in Georgia's post-secondary enrollment are cited as evidence of HOPE's success. Figure 1 plots full- and part-time enrollment at Georgia's two- and four-year colleges and universities from 1990 to 1997. Enrollment in Georgia grew steadily over most of this period, rising from 250,000 in 1990 to 320,000 in 1996; enrollment dropped off slightly in 1997. By contrast, enrollment levels in the rest of the southeastern United States[17] peaked in 1992 and have been relatively

[15] As a result of this provision and the scaling back of the state's need-based State Student Incentive Grants (SSIGs), some low-income students have actually seen their state aid reduced slightly since HOPE was introduced (Jaffe, 1997). This contemporaneous shift in SSIG spending has the potential to pollute the paper's estimates, especially the specifications in which low-income youth are used as a control group for upper-income youth. However, SSIG spending was so miniscule – $5.2 million in 1995, before the program was scaled back – that the impact of its elimination on the estimates is likely inconsequential.

[16] In 1995, only 3.7 percent of dependent students from families with incomes over $40,000 received federal grant aid, while 57 percent of those from families with income under $20,000 did so (National Center for Education Statistics, 1998).

[17] The Southeastern US consists of the South Atlantic and East South Central Census Divisions, which are defined in the next section.

flat since (see Figure 2). The same pattern holds in the entire US (see Figure 3). These figures may be surprising, since we frequently hear that college attendance is on the upswing. But during the 1990s, two countervailing trends have been at work: college attendance rates have been on the rise but the size of the college-age cohort has been steadily shrinking. The net result, in most of the country, has been flat enrollment levels.[18]

To demonstrate relative growth rates in Georgia, Figure 4 plots the percentage change in enrollment since 1990 in Georgia, the Southeast and the US. The rate of enrollment growth in Georgia far outstrips that in the comparison groups: enrollment in Georgia grew 19 percent from 1990 to 1997 while growth in the Southeast and US was four and three percent, respectively. The key question is whether the relatively high rate of enrollment growth in Georgia can be attributed to the HOPE Scholarship. Can an aid program that is aimed at middle- and upper-income youth produce the substantial growth in college attendance that Georgia has experienced? In the next section, I discuss the empirical strategy I will use to answer this question.

IV. Empirical Methodology

The empirical approach of the paper is straightforward. I examine changes in college attendance rates over time within Georgia, looking for discontinuities in attendance rates around the time of the introduction of the HOPE Scholarship. A control group is required in order to net out any secular trends in college attendance. A natural control group is the other states of the southeastern United States. I use as a control group the South Atlantic and East South Central Census Divisions, which consist of Georgia plus Alabama, Delaware, the District of Columbia, Florida, Kentucky, Maryland, Mississippi, North Carolina, South Carolina, Tennessee, Virginia and West Virginia. As will be shown below, the results are robust to the choice of control group.

[18] See Kane (1999a) for a discussion of trends in cohort size and college attendance.

The effect of HOPE is identified by differences between Georgia and the rest of the southeastern United States in the time trend of college attendance rates. I use difference-in-differences estimation, comparing attendance rates before and after HOPE was introduced, within Georgia and in the rest of the region. This calculation can be made using ordinary least squares:

$$(7) \quad y_i = \alpha_1 + \beta_1 (Georgia_i * After_i) + \delta_1 Georgia_i + \gamma_1 After_i + \nu_{i1}$$

where the dependent variable is a binary measure of college attendance, $Georgia_i$ is a binary variable that is set to one if a youth is a Georgia resident and $After_i$ is a binary variable that is set to one in the sample years in which HOPE was in place (1993 forward). This specification controls for time trends in college attendance, as well as for the average effect on attendance of being a Georgia resident. The reduced-form effect of the HOPE Scholarship is identified by β_1. The identifying assumption is that any relative trend in the attendance of Georgia youth is attributable to the introduction of HOPE.

I also undertake a strategy that uses within-state control groups. This triple-differencing approach exploits key institutional aspects of HOPE. First, HOPE was initially open to only the youngest high school graduates. In September of 1993, for example, the only HOPE recipients were members of the high school class of 1993. As a result, older youth form a natural control group against which to measure the effect of HOPE. I pool the sample of older (23 to 24) and younger (18 to 19) college-age youth and run the following regression:

$$(8) \quad y_i = \alpha_2 + \beta_2 (Georgia_i * After_i) + \delta_2 Georgia_i + \gamma_2 After_i + \phi (Georgia_i * After_i * Young_i) + \eta (Georgia_i * Young_i) + \lambda (After_i * Young_i) + \pi Young_i + \nu_{i1}$$

In this equation, $Young_i$ is a dummy that indicates whether a person is aged 18 or 19. The coefficient of interest is ϕ. This approach nets out both trends in the college attendance of 18- to 19-year-olds and within-Georgia shocks that affect the schooling decisions of both younger and older members of the college-age population.

The second triple-differencing strategy exploits HOPE's family income eligibility rules. I construct two groups: the over-$50,000 group, which is automatically eligible for HOPE, and the under-

$50,000 group, which is a mix of those who are eligible, ineligible and partly eligible for HOPE.[19] I then run the same specification as that of Equation (8) but with the variable $Young_i$ replaced by a dummy indicating that a youth is from an upper-income family.

Data

The data for the analysis are the 1989 though 1997 October Current Population Surveys. The IPEDS, the source of the enrollment data in Figures 1 through 4, does not allow for identification of the particular age and income groups that were exposed to HOPE. In particular, the annual IPEDS enrollment survey does not contain information about students' ages. Since HOPE has been made available to Georgia residents on the basis of their year of high school graduation, the lack of age data in the IPEDS makes it of limited use for determining HOPE's impact.[20]

There are limitations to using the CPS to analyze the impact of state higher education policy on college enrollment. First, state samples are small: for the period 1989 to 1997, there are a total of 470 18-to-19-year-olds from Georgia in the October CPS. As a result, year-to-year changes in enrollment rates within Georgia are fairly noisy.[21] The small samples also preclude any informative analysis of detailed schooling choices, such as whether college students are induced by HOPE to attend public vs. private schools, or four-year vs. two-year schools.

Second, information about a youth's family background is not consistently available in the CPS. Family background variables, such as parental income, are available only for those youth that appear on their parents' CPS record. A youth appears on her family's record for one of two reasons: she lives with her family or she is away at college. The sample of youth for which family background information is

[19] The use of family income data in the Current Population Survey in this context potentially produces biased estimates. I discuss this point below.

[20] Age data is available for 1991, 1993, 1995 and 1997, but the response rate in the preliminary release of the 1997 data is too low to allow for reliable comparison to previous years.

[21] I could more than double the sample by extending the age cutoff to 22. However, as was discussed earlier, older youth were not eligible for HOPE during its early years.

available is therefore a function of the college enrollment rate. This form of sample selection will produce bias in models where college attendance is an outcome of interest.[22] One of the estimation strategies I test requires family income information, and for that analysis the sample is limited to those who appear on their parents' record. I test for the sensitivity of these results to this form of sample selection. The bulk of the analysis is based on the full sample of 18- to 19- year-olds and is not subject to this source of bias.

Third, the CPS identifies neither the state in which a person attended high school nor the state in which she attends college. A reasonable assumption is that 18- to 19-year-olds attended high school in the state in which they currently reside. With a group so young, migration across state lines, other than to attend college, should be minimal. And when a youth does go out of state to college, CPS coding standards are that she is recorded as a resident of her home state.[23] Since the CPS does not provide the state in which the student is actually going to college, I am unable to detect if HOPE has altered not just the rate of attendance but the proclivity of youth to attend college in-state.[24]

All estimates are undertaken using ordinary least squares. Probit produces similar results. The CPS sample weights are used in all the regressions. The standard errors are adjusted for heteroskedasticity due to the binary dependent variable. Standard errors are also adjusted for correlation within state and year.

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[22] Cameron and Heckman (1999) discuss this point.

[23] Such youth enter the sample if their parents have been selected as a CPS household and appear on their parents' interview record. Youth who leave home and set up independent households do not show up on their parents' record and are recorded as residents of whatever state they live in. The overwhelming majority (about 90 percent) of 18- to 19-year-olds do show up on their parents' record, so these coding rules appear to hold in practice.

[24] This aspect of HOPE's effect can be explored with the IPEDS, which every other year gathers data about students' state of residence. However, there are not enough survey years available at this time to allow such analysis.

V. Results

Difference-in-Differences Estimates

Table 1 shows college attendance rates for youth that are residents of Georgia and the rest of the Southeast, before and after the Georgia HOPE Scholarship was introduced in 1993. Previous to the introduction of HOPE, the enrollment rate in Georgia of 18- to 19-year-olds was relatively low: 30.0 percent, as compared to 41.5 percent in the rest of the Southeast. After HOPE was introduced, the enrollment rate in the rest of the Southeast did not change appreciably, dropping to 41.4 percent. However, the Georgia enrollment rate rose quite a bit, to 37.8 percent.

These two differences are differenced in the last column of Table 1. The implied effect of HOPE on the college enrollment rate is 7.9 percentage points. In Table 2, I make the same calculation using ordinary least squares. Standard errors are adjusted for heteroskedasticity and correlation within state-year cells and the regressions are weighted by the CPS sample weights. In the first row of Column (1) is the estimate that corresponds to that of Table 1.[25] The estimate of 7.9 percent is significant at the one-percent level. This is a fairly large effect, given an initial attendance rate in Georgia of 30 percent. The result implies that HOPE increased attendance probabilities by about 25 percent (7.9 percentage points/30 percentage points). Further, the estimates suggest that HOPE nearly closed the gap between Georgia and the rest of the Southeast in college attendance. Later, I will put this effect in perspective by comparing it to previous estimates of the response of college attendance to subsidies.

In the second column of Table 2, I add a set of covariates to the regression. For reasons discussed earlier, I limit myself to covariates that are available for the entire sample. Variables whose generation requires that the youth and parents appear on the same record, such as parental income and education, are

[25] The two estimates are necessarily the same, since it is computationally equivalent to take differences in the means in Table 1 and to regress attendance against the Georgia dummy, the after dummy and their interaction.

not included. I include indicator variables for residence in a metro area, being black, survey year and age. The estimate drops slightly, from 7.9 percentage points to 7.5 percentage points, with a standard error of 3.0 percentage points. The estimate is still significant at the two-percent level.

I next test whether the estimate is sensitive to the choice of control states. In Table 3, I run the difference-in-difference regression using as control states, in turn, the entire Southeast, the states that border Georgia, and the entire United States. The border-state estimate is 8.7 percentage points, as compared to 7.9 percentage points for the southeastern states. The estimate is significant at the one-percent level. In Column (3) I expand the control group to the entire United States. The coefficient drops to 7.0 percentage points but is estimated with somewhat more precision, so that it is still significant at the one-percent level. The estimates are therefore relatively stable across choice of control group, ranging from 7.0 percentage points to 8.7 percentage points. None of the estimates is more than a standard error away from the other two. Since the results of the paper are consistent across choice of control group, I will only show results that use the southeastern states as the control group.

Controlling for Georgia-Specific Economic Shocks

Georgia may have experienced economic shocks that were not shared with its neighboring states. In this case, the college attendance rate in Georgia may have diverged from that of its neighbors for reasons unrelated to the introduction of HOPE. I attempt to address this problem in two ways. First, in Column (3) of Table 2, I add to the difference-in-differences regression the unemployment rate in the youth's state of residence during the survey year. The coefficient on the unemployment rate is significant and negative. For each ten-percentage point rise in unemployment, college attendance drops 2.8 percentage points. The coefficient of interest is unaffected, however: the difference-in-differences estimate is 7.6 percentage points and is significant at the one-percent level.[26]

[26] I have also experimented with specifications that include lags of the unemployment rate. The results are substantively unchanged.

An alternative, non-parametric method of controlling for Georgia-specific economic shocks is to use a within-state control group. Youth in their early twenties are likely to experience the same shocks to the opportunity costs of college as youth in their late teens. The HOPE Scholarship differentially affects these two groups, however. HOPE eligibility is based on graduating from a Georgia high school in 1993 or later. Even in 1997, those who are aged 23 to 24 would have graduated from high school before HOPE was introduced, and so are generally not eligible for the program. Changes in the program rules in 1995 did open HOPE to older Georgians who had completed two years of college with a 3.0 average. But since this older group has never been eligible for subsidies in their first two years of college, they still form a valid control group when the outcome is attendance at the freshman and sophomore level.[27]

Results for this analysis are in Table 4. In the first two columns are separate estimates for the younger, eligible group and the older, ineligible group. The impact of HOPE on freshman and sophomore enrollment among 18- to 19-year-olds is similar to its effect on enrollment at any level of college: 8.1 percentage points, with a standard error of 3.0 percentage points. Among older students, who should be unaffected by HOPE, the effect is zero: -0.2 percentage points with a standard error of 1.8 percentage points. In Column (3), I pool the two age groups into a single regression and test for the statistical significance of the difference between these two coefficients. The source of identification is now the triple difference show in Equation (8): Georgia vs. the rest of the Southeast, 18- to 19-year-olds vs. 23- to 24-year-olds, and before 1993 vs. after 1993. Main effects for these attributes are included in the regression, along with a full set of their second-order interactions. In Georgia, 18- to 19-year-olds increased their attendance relative to 23- to 24-year-olds by 8.3 percentage points more than they did in the other southeastern states. This triple-difference estimate is significant at the five-percent level. If the identifying

[27] The prospect of receiving HOPE in the third year may affect the probability that an older student enters college. This will tend to bias toward zero my estimate of HOPE's effect when older students are used as the control group.

assumption of the analysis is correct, then this result suggests that the impact of HOPE eligibility was to increase the college attendance rate by 8.3 percentage points.

These last results effectively control for any trends in employment opportunity and college costs (e.g., tuition prices) that affect both the younger and older members of the college-age population. The estimate obtained from this specification is statistically the same as that obtained from the simplest difference-in-differences analysis in Table 2. The conclusion that HOPE increased college attendance of Georgia's young people by about seven to eight percentage points is therefore robust to a variety of specifications and control groups.

Using Income Data to Identify the Eligible Population

As was discussed earlier, eligibility for Georgia's HOPE Scholarship varies substantially by income. The analysis so far has measured increases in relative attendance among all Georgia youth. However, only a subset of this population was actually affected by HOPE. In order to narrow in on the group that was eligible for the subsidy, I draw on family income data. Since the group of youth for whom family income is available is a function of the college attendance rate, I first check the sensitivity of the difference-in-differences estimate to sample selection. In Column (1) of Table 5 is the difference-in-differences estimate from the previous section: 7.9 percentage points. In Column (2) I run the same regression with only the 75 percent of 18- to 19-year-olds that appear on their parents' record and have family income data available. The sub-sample estimate is not statistically different from the full-sample estimate, indicating that, at least for the simple difference-in-differences analysis, selection bias is not a problem.

I next divide the sample by income and repeat the difference-in-differences analysis. Georgia uses $50,000 as the income threshold above which students are automatically eligible for the HOPE Scholarship. In Column (3) and Column (4) of Table 5 are regression results for sample members from families with annual income above and below $50,000, respectively. Among those from higher-income families, the difference-in-differences estimate is 12.9 percentage points, with a standard error of 5.8

percentage points. By contrast, the estimate for lower-income students is 2.0 percentage points and is not statistically different from zero. In Column (5) of Table 5, I pool the two income groups and test whether the difference in their responses to HOPE is statistically significant. A full set of main effects for Georgia residence, income, and time is included in the regression, along with their second-order interactions. The triple interaction of Georgia residence, being of low income and time identifies the effect of the HOPE scholarship in this regression. The difference in response across income groups is significant at the ten-percent level. In Georgia, higher-income youth increased their attendance relative to lower-income youth by 10.9 percentage points more than they did in the other southeastern states.[28]

These results should be interpreted with caution. Selection bias in the CPS School Enrollment Supplement may be most severe among low-income youth. If the college attendance of low-income youth is particularly sensitive to college costs, then the rate at which they appear on their parents' records will co-vary particularly strongly with college costs. Selection bias, which will bias downward the estimated effect of a subsidy on college attendance, will then be most severe for low-income students. Some of the difference in attendance response across income groups found in Table 5 may therefore be driven by differing degrees of bias in the estimated coefficients.

The Differential Impact of HOPE on Blacks and Whites in Georgia

Given the focus of the Georgia HOPE Scholarship on middle- and upper-income families, it is probable that the program has had a differential impact on the college attendance of blacks and whites. To get a sense of the correlation between race and the income guidelines of the Georgia HOPE Scholarship, I examined the family incomes of 15- to 17-year-olds in the 1989-1997 October CPS.[29] In Georgia during 1989 to 1997, 96 percent of black and 67 percent of white 15- to 17-year-olds lived in families with

[28] Adding a set of covariates (race, urbanicity, and age) to Columns (3) through (5) of Table 5 does not affect the estimates, although their precision is increased slightly.

[29] Youth of these ages are chosen because they almost always show up in the same record as their parents.

incomes less than $50,000.[30] The numbers for the rest of the United States are similar: 90 and 72 percent, respectively.[31] These figures indicate than very few black youth in Georgia are automatically eligible for a HOPE Scholarship, while about 30 percent of white youth are automatically eligible.

In Table 6, I show the results of splitting the difference-in-differences analysis by race; the estimates for the entire sample are in the first column for ease of comparison. In Column (2) are the estimates for whites. College attendance among whites rose 12.3 percentage points faster over this period in Georgia than in the rest of the southeastern United States. The estimate is significant at the one-percent level. By contrast, college attendance among blacks did not rise significantly in Georgia relative to the other southeastern states: the difference-in-differences estimate for blacks is -2.7 percentage points, with a standard error of 5.2 percentage points. In Column (5) I pool blacks and whites and test for a statistically significant difference in their responses to HOPE. The responses of whites and blacks are different at the six- percent level of statistical significance.

I have characterized race as a proxy for income in this analysis, but race may also correlate with other attributes that affect eligibility for HOPE. For example, a smaller proportion of blacks than whites may meet the high school GPA requirement of HOPE. The analysis of this section shows us in a reduced-form the differential impact of HOPE on whites and blacks. The data do not allow us to distinguish how much of this differential is due to HOPE's income rules and how much is due to its academic requirements.[32]

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[30] Note that this refers to the nominal income distribution. This is appropriate, since the Georgia rules are written in nominal rather than real terms.

[31] These figures for the share with income below $50,000 may appear high. This is because the unit of observation is not the family but the child. Since lower-income families have more children, the distribution of family income within a sample of children has a lower mean than the distribution of family income within a sample of families.

[32] In future drafts of this paper, I plan to approach this question by using the National Education Longitudinal Survey of 1988 to examine the correlation of high school grades with race.

Is the Timing Right?

The results so far suggest that HOPE has had a significant impact on college attendance rates in Georgia. This section probes the robustness of this result by examining more closely the timing of the relative rise in Georgia's attendance rate. A sharp relative increase in attendance rates in Georgia in the years after 1993 is consistent with the hypothesis that HOPE induced the increase in college-going that difference-in-differences has picked up. By contrast, a slow relative rise in Georgia's attendance rates that began before HOPE was introduced suggests that HOPE is not responsible for this increased attendance.

To test for such confounding trends, I allow relative attendance rates in Georgia to vary by year. In the previous sections, the coefficient of interest was that on the interaction of the Georgia and "after" dummies. In the current analysis, the Georgia dummy is instead interacted with a full set of year dummies. As in previous specifications, I include the state unemployment rate and dummies for age, year, urbanicity and race.

Figure 5 graphs the coefficients on the Georgia-year interactions. The 95 percent confidence interval for each point estimate is also plotted. The 1989 interaction has been normalized to zero. The sharpest rise in Georgia's attendance rates relative to the rest of the Southeast occurred in 1992, the year before HOPE was introduced. Relative attendance continued to rise slowly through 1995, rose sharply in 1996 and then dropped sharply in 1997. These results are not supportive of the hypothesis that HOPE increased college attendance, as the coefficients show no discontinuous shift at the time of HOPE's introduction.

However, not all Georgia youth were eligible for HOPE. In particular, high-income youth were more likely to be eligible than low-income youth. Figure 6 replicates the previous figure, except that the sample is now limited to those from families with incomes less than $50,000. This is the group that was generally ineligible for HOPE and which, as was shown in Table 5, did not experience a relative increase in attendance during this period. There is no upward trend in this graph, and certainly no pattern that is

consistent with a HOPE effect. There is a slight relative rise in attendance rates among low-income youth in Georgia in 1992, before HOPE's introduction, but this effect is gone by 1994.

In Figure 7, the analogous graph for middle- and upper-income youth is plotted. For this group, the time pattern of relative attendance rates is roughly consistent with the timing of HOPE. Relative attendance rates are flat through 1993, the first year of the program. This is to be expected, since in 1993 the family income cap on participation was $66,000, thereby excluding from HOPE much of the population whose relative attendance rates are shown in this figure. There is, however, a large relative increase in this group's attendance rate in 1994, the year that the income cap was raised to $100,000. There is another large relative increase in 1995, the year that the income cap was eliminated completely. The interaction term drops back substantially in 1996, though not to its pre-HOPE levels.

A sharp drop in enrollment in 1997 is also seen in the aggregate data plotted in Figure 1, which suggests that noise in the CPS is not driving this time pattern. It is possible that early excitement and publicity about HOPE had faded by 1996, and that the smaller effects in 1996-97 in Figure 7 best reflect the program's long-term impact. Assuming that the first few years of HOPE reflect the disequilibrium effect of the program, we can estimate its long-term impact by dropping 1993 through 1995 from the sample and again running the difference-in-difference regressions. For those from families with incomes more than $50,000, the new estimate is 10.5 percentage points (with a standard error of 6.1 percentage points), as compared to the estimate of 12.9 percentage points that was obtained from the full 1989-97 sample. For the low-income group, the difference-in-difference estimate is again indistinguishable from zero: 0.7 percentage points with a standard error of 5.5.

An alternative explanation for the drop-off in the program's effect at the end of the sample is Georgia's hosting of the 1996 Summer Olympics. The Olympics created jobs in the construction, restaurant and hotel industries, all of which were likely to tap younger workers to fill temporary positions. These expanded employment opportunities may have diverted young high school graduates from college. However, that the drop-off occurs among high- but not low-income youth casts doubt on this explanation.

VI. Policy Implications

The analysis of the previous section strongly suggests that HOPE increased attendance rates in Georgia. Aggregate enrollment data show large relative increases in Georgia's enrollment levels, while the CPS suggests that attendance probabilities have risen as well. The attendance rate of Georgia's 18- to 19-year-olds has risen by 7.5 to 8.3 percentage points relative to that in the rest of the Southeast (Tables 2 and 4). When the population is narrowly defined to include only those youth likely to be eligible for HOPE, the estimate rises to 10.9 percentage points (Table 5). Even if we exclude from the analysis the first few years of HOPE, which may have produced unusually large responses, these estimates are relatively unaffected.

How do these estimates compare to previous research on the effect of aid on attendance? Angrist (1993), Kane (1994) and Reyes (1995) each find that a $1,000 drop in college costs increases attendance by about four percentage points. In previous work (Dynarski, 1999), I have estimated that $1,000 in grant aid increases attendance of a low- to middle-income population by five percentage points. We can similarly scale HOPE's effect. HOPE paid for tuition and mandatory fees at Georgia's public colleges and universities, which averaged $1900 ($1997) from 1993 to 1997.[33] The estimates of this paper therefore translate into an increase in the attendance rate of 3.9 to 5.7 percentage points for each $1,000 in subsidy. This places the estimate of HOPE's effect on middle- and upper-income youth at the high end of previous estimates of the effect of aid on low-income students.

In light of the conventional wisdom that middle- and high-income youth are infra-marginal consumers of higher education, this is a surprisingly large effect. There are two possible explanations. First, as was discussed earlier, a larger proportion of upper- than lower-income students may be close to the margin of college attendance; if the non-financial costs of college are normally distributed within both

[33] Those attending private colleges are eligible for an annual grant, which was $500 in 1993 and gradually increased to $3,000 by 1996. For the 1993-97 period, $1,900 is a fair approximation of HOPE's average subsidy to private college attendance.

the lower- and upper-income populations, this is quite plausible. A given subsidy may therefore cause a relatively large share of high-income students to spill over the margin into college. Second, particular characteristics of Georgia and the HOPE Scholarship may intensify the program's effect. This possibility directly affects the validity of the paper's estimates in predicting the effect of other middle-class aid programs. I next turn to a discussion of how confidently we can extrapolate estimates based on the Georgia HOPE Scholarship to programs such as the federal Hope Scholarship.

What Can Georgia HOPE Tell Us About the Federal Hope Scholarship?

The Georgia HOPE Scholarship shares some key characteristics with the federal Hope Scholarship. They are of roughly equal financial value. The maximum federal Hope Scholarship is $1500, received by an eligible student who pays at least $2,000 in annual tuition. The Lifetime Learning Credit, Hope's companion program, currently has a maximum value of $1,000 (this will increase to $2,000 by 2003).[34] The average value of the Georgia HOPE Scholarship for those attending a public college or university is $1,900. Further, the two programs focus their subsidies on roughly the same portion of the income distribution. Both the Georgia HOPE Scholarship and the federal tax credits reduce their subsidy one dollar for each dollar of other financial aid received by the student There is no income cap on Georgia's program, and the federal caps exclude a very narrow slice of the income distribution. There are important differences between the Georgia and federal programs, however. As will become clear, these differences generally suggest that the federal program will have a smaller impact on college attendance rates than has Georgia's.

First, the federal program is national in scope: a person can use the credit anywhere in the US. By contrast, Georgia requires that a student stay in the state in order to receive the scholarship. However, the

[34] The Hope Scholarship is available for just the first two years of college, while the Lifetime Learning Credit (LLC) is available at any level. Hope is more generous, allowing a credit equal to the sum of 100 percent of the first $1,000 of tuition and 50 percent of the second. The LLC provides a credit of 10 percent of up to $10,000 in tuition ($20,000 as of 2003), which makes it less valuable than Hope for those attending low-tuition schools.

vast majority (83 percent) of freshmen attends college in their home state.[35] This figure is likely even higher for youth on the margin of college attendance. As a result, this particular difference between the two programs is most likely inconsequential to their relative impact on college attendance rates.

A second difference between the two programs is in their probable impact on tuition prices. In Georgia, the state government both distributes the subsidy and sets tuition prices. This reduces considerably the risk that schools will attempt to capture the subsidy by raising tuition. There is no such brake in the federal program, since the federal government has no control over prices in the higher-education market. That schools rather than students will capture at least part of the federal subsidy will push down its impact relative to that of the Georgia program. Further, if the federal Hope Scholarship leads to tuition increases, the net effect of this program may be to *decrease* black and low-income attendance, since these populations will face the full impact of higher tuition but largely be ineligible for the subsidy.

A third difference between the federal and Georgia programs lies in their grade requirements. Georgia requires a 3.0 GPA in both high school and college; the federal program has no grade cutoffs. The college academic requirement almost certainly reduces HOPE's impact on college attendance rates. The college GPA requirement can only affect attendance probabilities by altering persistence rates. But its incentives operate only on the margin between good and mediocre grades, which is not the same margin as persisting and dropping out of college. Examining grades among HOPE recipients makes this clear: only 25 percent who received HOPE as freshmen during academic year 1994-95 got good enough grades that their scholarships were renewed the next year (Byron and Henry, 1997). Blacks at the University of Georgia are twice as likely as whites to lose their scholarship after the freshman year (Healy, 1997). The college GPA requirement therefore culls from HOPE eligibility not just those who can't handle college, but the median college student. The impact of the high school GPA is more ambiguous: it may provide

[35] National Center for Education Statistics (1998), Table 203.

incentives to students to work harder in high school and it may exclude from the subsidy students who did mediocre work in high school but are still capable of college-level courses.[36]

Georgia's program differs from the federal Hope Scholarship in another important way: it is unusually simple. The information and transaction costs of HOPE are extremely low. Knowledge about the program and its rules is widespread; high schools constantly hammer scholarship rules into their students. Fifty-nine percent of a random telephone survey of high school *freshmen*, when asked to list some requirements of HOPE, volunteered that a high school GPA of 3.0 was necessary. More than seventy percent could name the program without prompting.[37] In terms of transaction costs, the paperwork is minimal, at least for students from families with incomes above $50,000. The application for the 1998-99 academic year for that group consists of a single page with about a dozen questions, of which the only financial query is: "Was your family's Adjusted Gross Income for 1997 $50,000 or more?" By contrast, the information and transaction costs of the federal tax credits are quite high. The federal Hope Scholarship operates through the tax code, not known for its transparency or simple paperwork. Taxpayers do not know the size of their credit until their federal tax liability for a given year has been calculated. And unlike the Georgia scholarship, which is delivered up front, the federal credit is not received until after the end of the tax year in which tuition has been paid. This feature of the program will reduce the its impact among families that are liquidity constrained.

A final key difference lies not in the program rules but in the initial conditions into which these two programs have been introduced. The college attendance rate in Georgia when HOPE was introduced much lower than that in the rest of the US. A large reservoir of youth that are not attending college may

[36] The requirement might also encourage grade inflation in high school, which would expand the pool of students that, at least on paper, meet minimum college entry requirements. There is already some evidence of grade inflation on the high school level. The average high school GPA of University of Georgia freshmen rose from 3.33 in 1993 to 3.52 in 1997. By contrast, over the same period average SAT scores of the same population barely increased, rising from a combined score of 1,078 to one of 1,090 (Healy, 1997).

[37] Henry and others (undated).

have contributed to the program's impact. It is likely that the effect of the federal Hope Scholarship will vary geographically, producing a larger impact in states where attendance is low and a smaller impact where attendance is high.

Most of the differences between the two programs point to the federal Hope Scholarship having a lesser impact on the college attendance of middle- and upper-income youth than has Georgia HOPE. The federal Hope Scholarship delivers its subsidy after tuition has been paid; is administered through the complex US tax code; threatens to push up tuition prices; and is being offered to a US population whose college attendance rates are substantially higher than those in Georgia. These characteristics combine to reduce the effect of the federal program relative to that of Georgia's. The results therefore provide an upper bound on the impact of the federal Hope Scholarship on eligible, recent high school graduates, suggesting that each $1,000 in tax credits could increase this group's college attendance rate by as much as 5.7 percentage points.

The results also provide a prediction of the distributional impact of the federal Hope Scholarship. In Georgia, the HOPE Scholarship has increased overall college attendance but widened the gap in attendance rates between whites and Blacks and between rich and poor. The results in Table 5 indicate that the gap in college attendance between upper- and lower-income youth in Georgia has risen ten percentage points more than in the rest of the Southeast. Similarly, the federal Hope Scholarship will likely widen an already large gulf between the college attendance rates of rich and poor youth in the US. Nationwide, the gap in attendance rates between recent high school graduates in the bottom and top quartiles of the family income distribution is 30 percentage points. Even after controlling for ability, as measured by standardized test scores, this gap remains quite large: among the middle third of test scorers, the gap between high- and low-income youth is 22 percent. Further, differences in college attendance across income groups have been growing over time.[38] A program, like the federal Hope Scholarship, that subsidizes the college attendance of only middle- and upper-income youth will only exacerbate this trend.

[38] The figures on college attendance, family income and test scores are from Ellwood and Kane (1999).

VII. Conclusion

The federal government and the states have recently enacted a slew of new student aid programs aimed at youth from middle- and high-income families. There has been little research on the sensitivity to college costs of this group's attendance rates. In this paper, I estimate the impact of aid on the college attendance of middle- and upper-income youth by evaluating the Georgia program that is the namesake and inspiration of the new federal Hope Scholarship: the HOPE (Helping Outstanding Pupils Educationally) Scholarship. The results suggest that Georgia's program has had a surprisingly large effect on the college attendance rate of middle- and high-income youth. Using a set of nearby states as a control group, I find that Georgia's program has likely increased the college attendance rate among 18- to 19-year-olds by 7.5 to 8.3 percentage points. Among the subset of youth that is most likely eligible for Georgia HOPE, I find that the attendance rate has risen relative to that in nearby states by 10.9 percentage points.

I further find that the program's effect is concentrated among Georgia's white students, who have experienced a 12.3 percentage point rise in their attendance rate. The black attendance rate in Georgia has not increased relative to that in comparison states since HOPE was introduced. The racial gap in college attendance in Georgia has therefore increased relative to its level in the rest of the Southeast. Georgia's program has also widened the gap in college attendance between those from low-income and high-income families. The federal Hope Scholarship, which focuses on the same slice of the family income distribution as Georgia's program, is also likely to exacerbate the already large racial and income gaps in college attendance.

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Table 1:
Difference-in-Differences
Share of 18-19-Year-Olds Attending College
October CPS, 1989-97

	Before 1993	1993 and After	Difference
Georgia	0.300	0.378	0.078
Rest of Southeastern States	0.415	0.414	-0.001
Difference	0.115	0.036	0.079

Note: Means are weighted by CPS sample weights. The southeastern states consist of the South Atlantic and East South Central Census Divisions: Alabama, Delaware, District of Columbia, Florida, Kentucky, Maryland, Mississippi, North Carolina, South Carolina, Tennessee, Virginia and West Virginia.

Table 2:
College Attendance of 18-19-Year-Olds
October CPS, 1989-97
Control Group: Southeastern States

	(1) *Difference-in-Differences*	(2) *Add Covariates*	(3) *Add Local Economic Conditions Controls*
After*Georgia	0.079 (0.029)	0.075 (0.030)	0.076 (0.029)
Georgia	-0.115 (0.023)	-0.100 (0.019)	-0.117 (0.019)
After	-0.001 (0.018)		
Age 18		-0.042 (0.014)	-0.043 (0.014)
Metro Resident		0.042 (0.016)	0.036 (0.015)
Black		-0.134 (0.014)	-0.132 (0.015)
State Unemployment Rate			-0.028 (0.008)
Year Dummies		Yes	
R^2	0.003	0.023	0.025
N	6,811	6,811	6,811

Note: Regressions are weighted by CPS sample weights. Standard errors are adjusted for heteroskedasticity and correlation within state-year cells. The Southeastern states are defined in the note to Table 1.

Table 3: Alternative Control Groups
College Enrollment of 18-19-Year-Olds
October CPS, 1989-97

	(1) Southeastern States	(2) States Bordering Georgia	(3) United States
After*Georgia	0.079	0.087	0.070
	(0.029)	(0.031)	(0.024)
Georgia	-0.115	-0.100	-0.135
	(0.023)	(0.025)	(0.021)
After	-0.001	-0.008	0.009
	(0.018)	(0.021)	(0.009)
R^2	0.003	0.003	0.001
N	6,811	4,275	32,266

Note: Regressions are weighted by CPS sample weights. Standard errors are adjusted for heteroskedasticity and correlation within state-year cells. The states that border Georgia are Alabama, Florida, North Carolina, South Carolina, and Tennessee. The Southeastern states are defined in the note to Table 1.

Table 4: Triple Difference, by Age
Freshman and Sophomore College Enrollment
October CPS, 1989-97
Control Group: Southeastern States

	(1) Difference-in-Differences: Age Group Affected by Scholarship (18-19)	(2) Difference-in-Differences: Age Group *Not* Affected by Scholarship (23-24)	(3) Difference-in-Differences-in-Differences Pooled Regression
After*Georgia*Age 18-19			0.083
			(0.042)
After*Georgia	0.081	-0.002	-0.002
	(0.030)	(0.018)	(0.018)
Georgia	-0.103	-0.009	-0.009
	(0.023)	(0.015)	(0.015)
After	-0.016	0.008	0.008
	(0.018)	(0.006)	(0.006)
Age 18-19			0.355
			(0.012)
Georgia*Age 18-19			-0.093
			(0.032)
After*Age 18-19			-0.024
			(0.019)
R^2	0.002	0.001	0.171
N	6,811	7,120	13,931

Note: Regressions are weighted by CPS sample weights. Standard errors are adjusted for heteroskedasticity and correlation within state-year cells. The Southeastern states are defined in the note to Table 1.

Table 5: Triple Difference, by Income
College Enrollment of 18-19-Year-Olds
October CPS, 1989-97
Control Group: Southeastern States

	(1) Full Sample	(2) Limit to Those With Parents' Income	(3) Parents' Income > $50K	(4) Parents' Income < $50K	(5) Triple Difference
After*Georgia*> $50K					0.109
					(0.062)
After*Georgia	0.079	0.075	0.129	0.020	0.020
	(0.029)	(0.040)	(0.058)	(0.050)	(0.050)
Georgia	-0.115	-0.095	-0.159	-0.067	-0.067
	(0.023)	(0.038)	(0.041)	(0.038)	(0.038)
After	-0.001	-0.030	-0.023	-0.027	-0.027
	(0.018)	(0.019)	(0.032)	(0.017)	(0.017)
> $50K					0.350
					(0.030)
Georgia*> $50K					-0.091
					(0.030)
After*> $50K					0.004
					(0.034)
R^2	0.003	0.002	0.005	0.002	0.096
N	6,811	4,805	1,207	3,598	4,805

Note: Regressions are weighted by CPS sample weights. Standard errors are adjusted for heteroskedasticity and correlation within state-year cells. The Southeastern states are defined in the note to Table 1.

Table 6: Triple Difference, by Race
College Enrollment of 18-19-Year-Olds
October CPS, 1989-97
Control Group: Southeastern States

	(1) Full Sample	(2) Whites	(3) Blacks	(4) Triple Difference
After*Georgia*White				0.149
				(0.079)
After*Georgia	0.079	0.123	-0.027	0.027
	(0.029)	(0.045)	(0.052)	(0.052)
Georgia	-0.115	-0.109	-0.088	-0.088
	(0.023)	(0.039)	(0.030)	(0.030)
After	-0.001	-0.002	-0.000	-0.000
	(0.018)	(0.022)	(0.026)	(0.026)
White				0.126
				(0.021)
Georgia*White				-0.020
				(0.058)
After*>White				-0.001
				(0.030)
R^2	0.003	0.002	0.007	0.019
N	6,811	4,974	1,837	6,811

Note: Regressions are weighted by CPS sample weights. Standard errors are adjusted for heteroskedasticity and correlation within state-year cells. The Southeastern states are defined in the note to Table 1.

Figure 1: Georgia
Enrollment at Two- and Four-Year Institutions, 1990-97
Millions of Students
Source: IPEDS

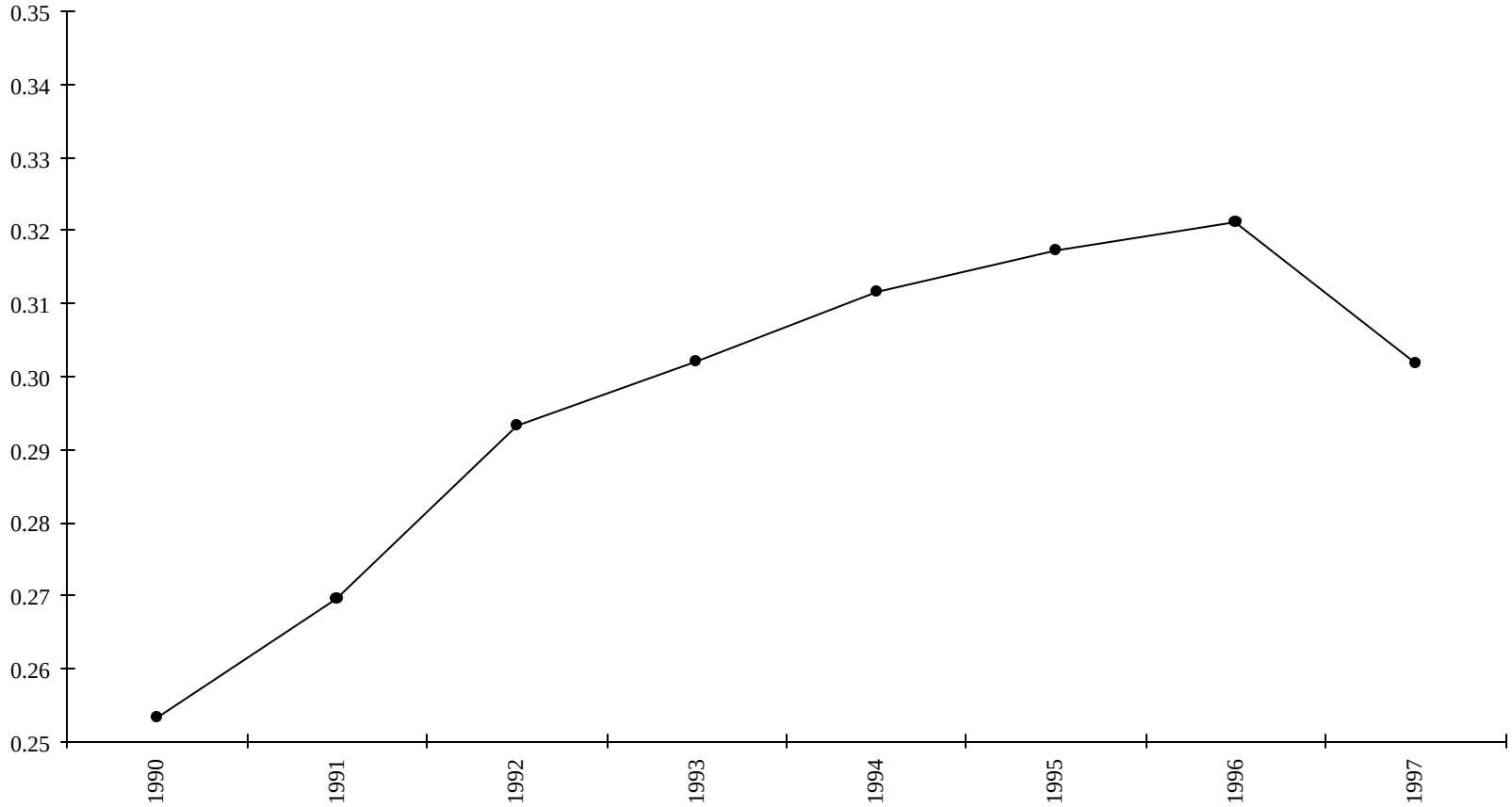


Figure 2: Southeastern United States
Enrollment at Two and Four-Year Institutions,1990-97
Millions of Students
Source: IPEDS

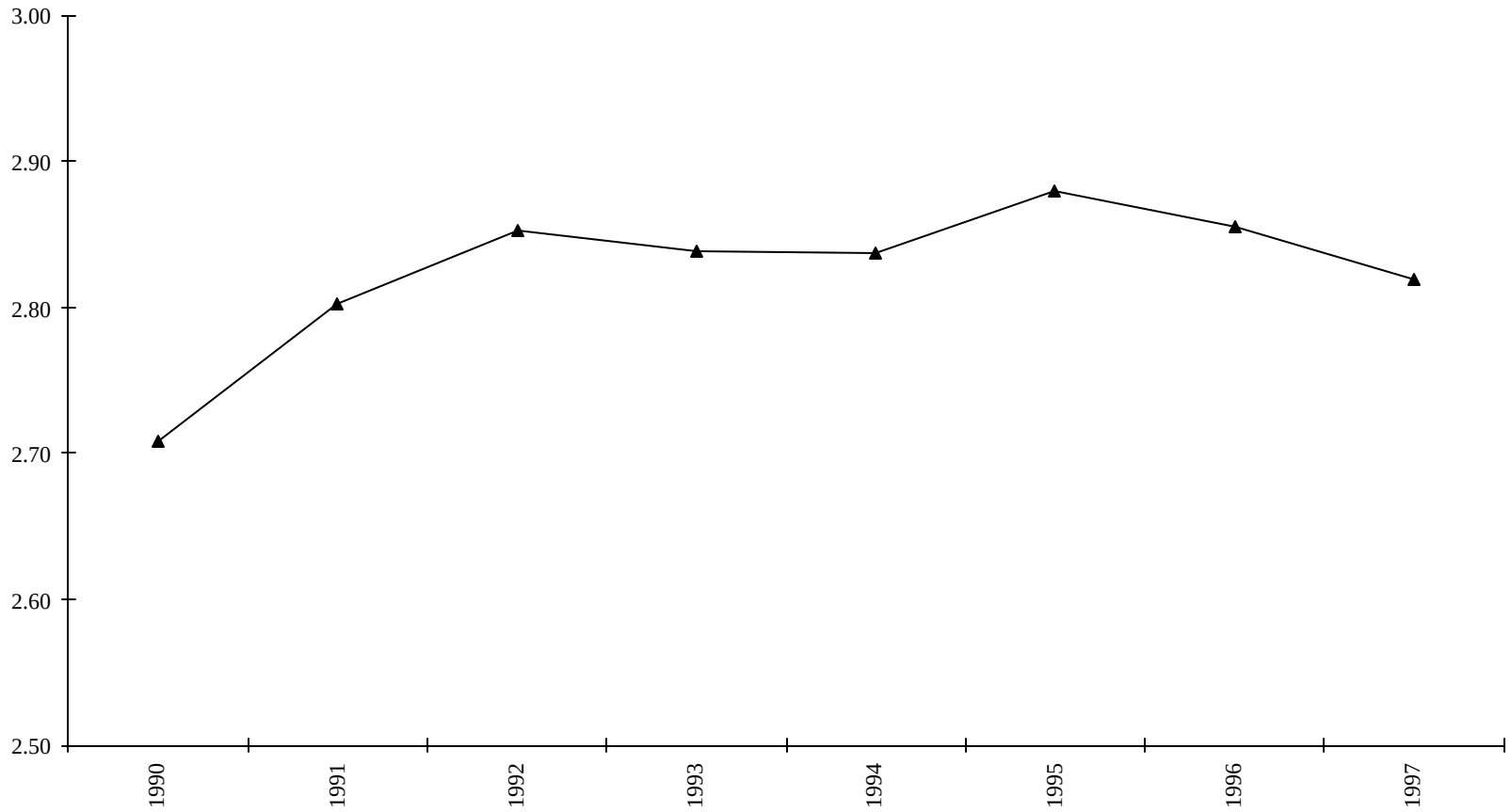


Figure 3: United States
Enrollment at Two and Four-Year Institutions,1990-97
Millions of Students
Source: IPEDS

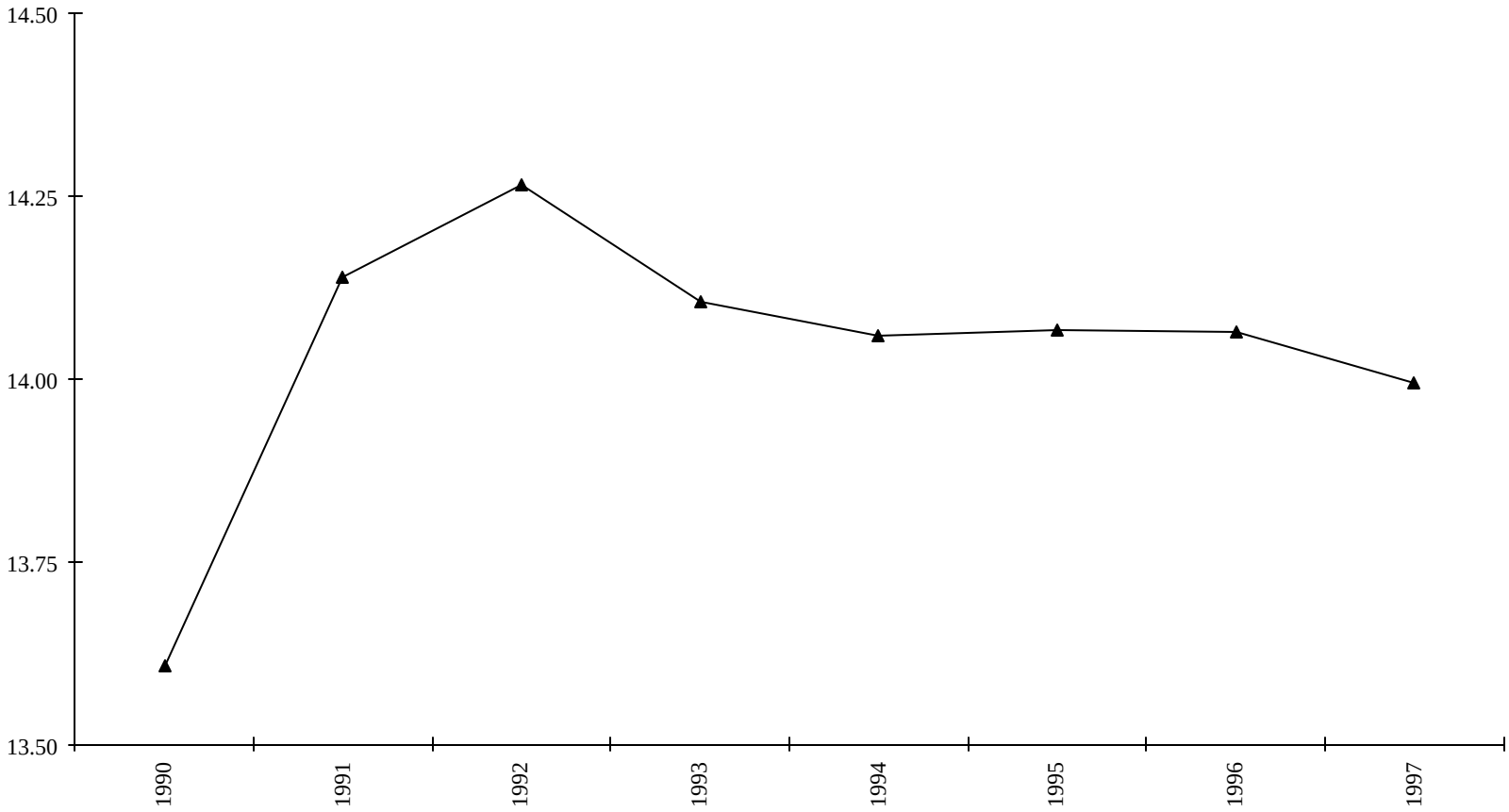


Figure 4: Percent Growth in Enrollment since 1990
Georgia, Southeast and US
Source: IPEDS

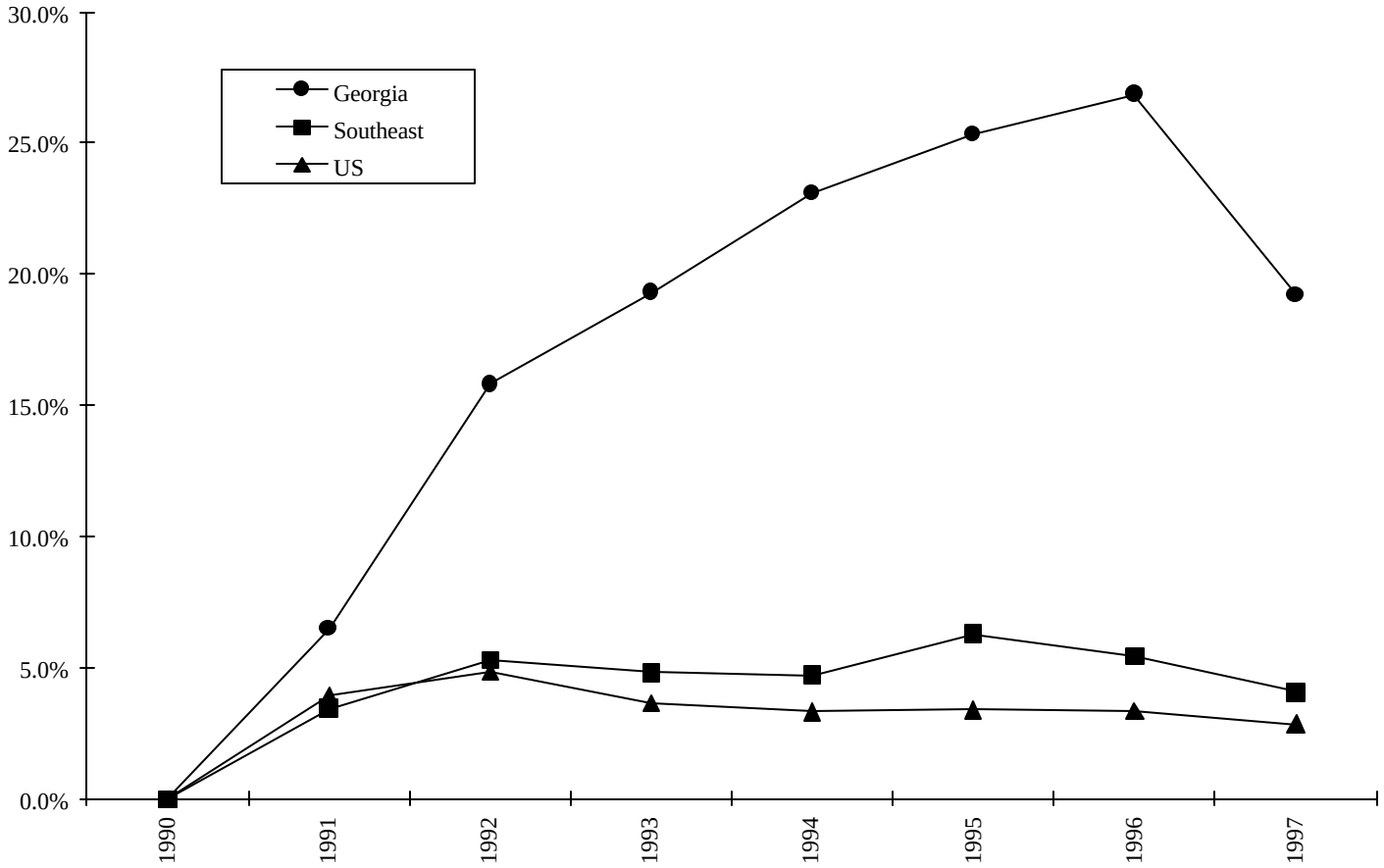
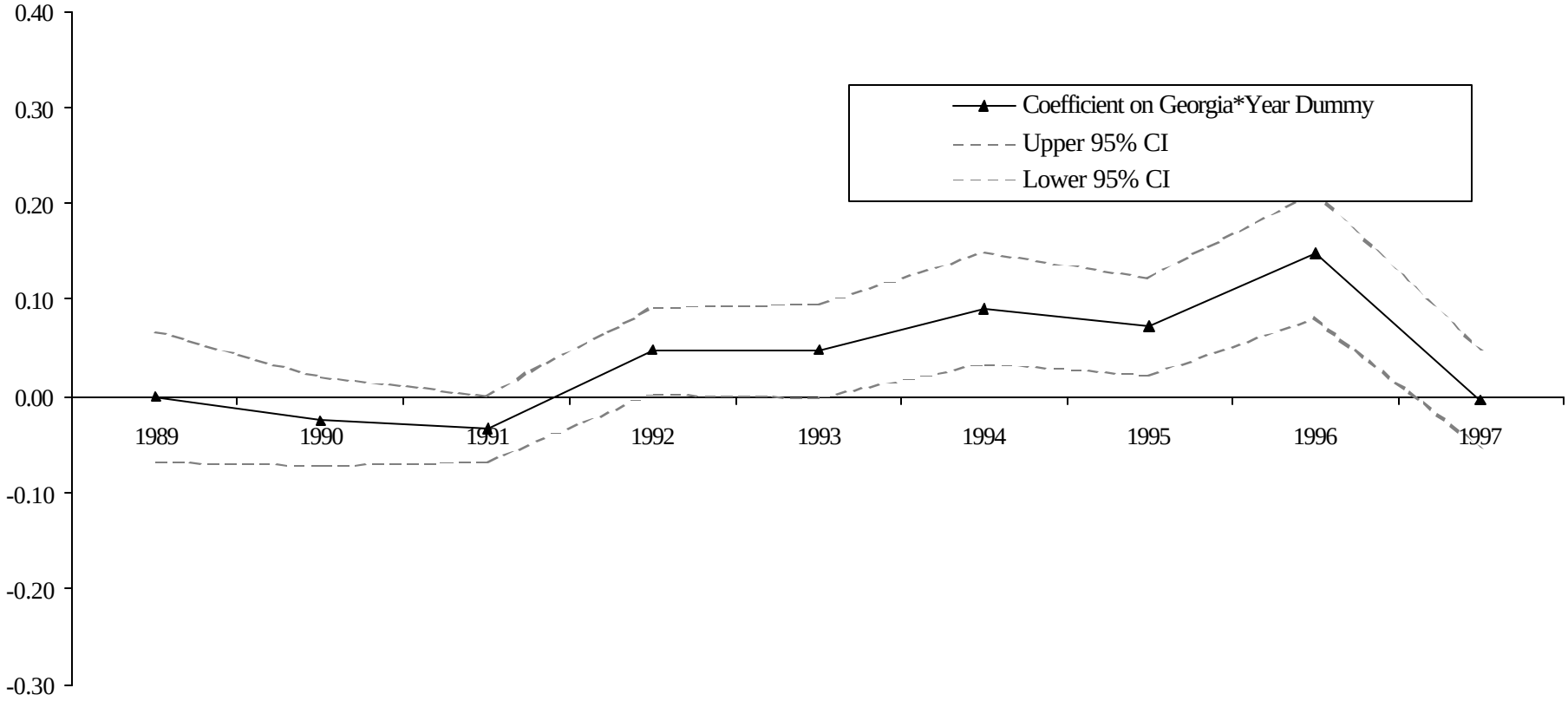
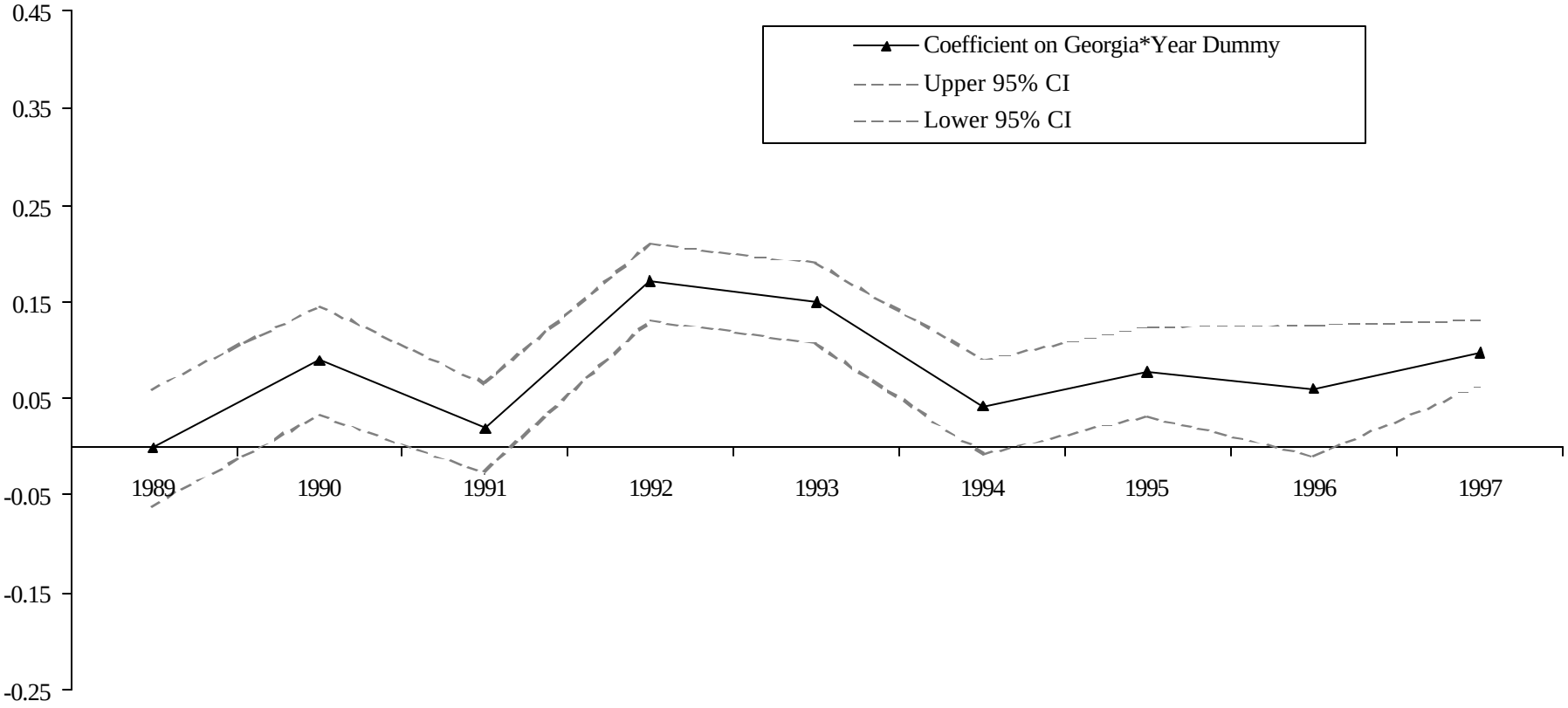


Figure 5:
Estimated Effect of HOPE Eligibility on College Attendance, By Year
1989 Normalized to Zero
Control Group: Southeastern States



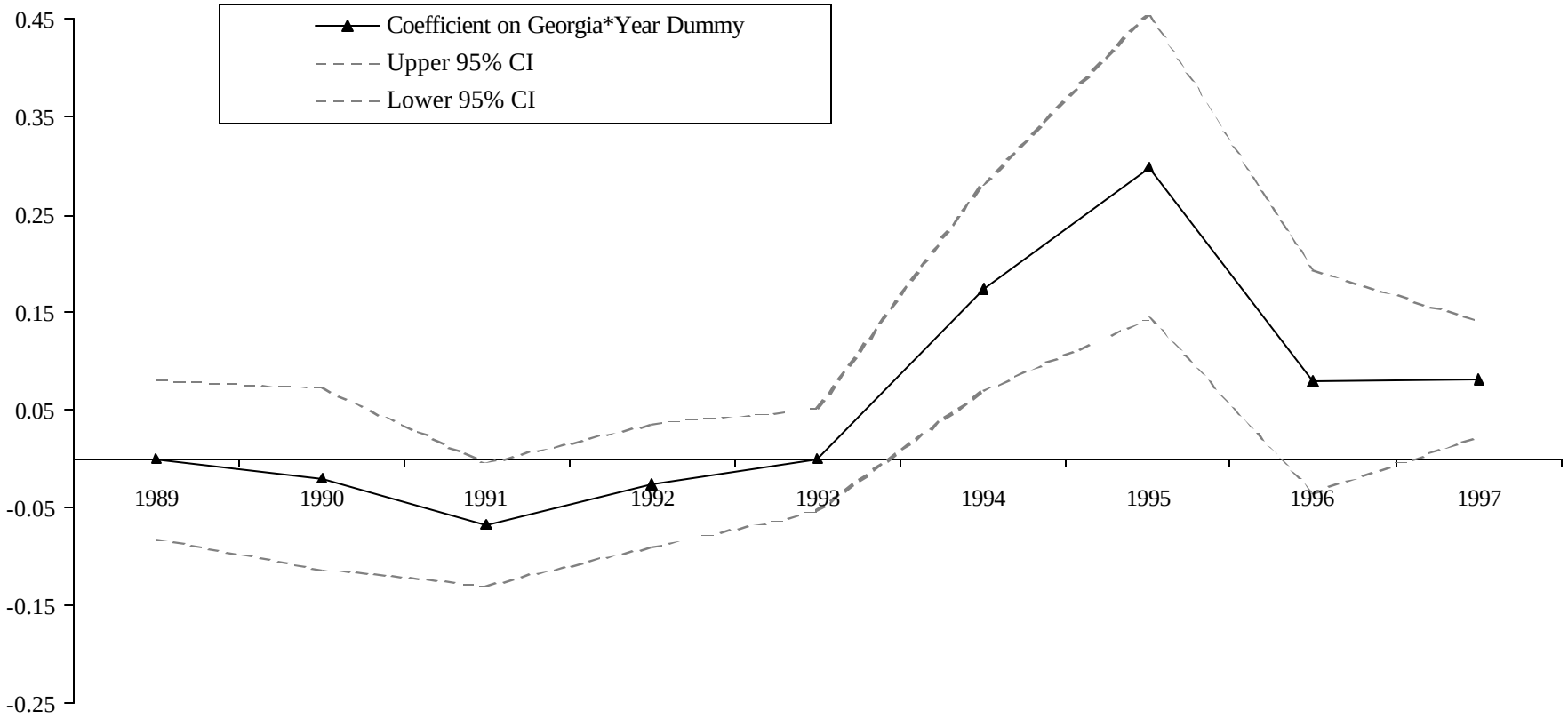
Graphed are the coefficients on the interaction of year dummies with the Georgia dummy. Coefficients are obtained from a single regression that includes the Georgia*year interactions as well as the state unemployment rate and dummies for year, age, race and urbanicity. Dependent variable is an indicator for college attendance.

Figure 6: Family Income < $50K
Estimated Effect of HOPE Eligibility on College Attendance, By Year
1989 Normalized to Zero
Control Group: Southeastern States



Graphed are the coefficients on the interaction of year dummies with the Georgia dummy. Coefficients are obtained from a single regression that includes the Georgia*year interactions as well as the state unemployment rate and dummies for year, age, race and urbanicity. Dependent variable is an indicator for college attendance.

Figure 7: Family Income > $50K
Estimated Effect of HOPE Eligibility on College Attendance, By Year
1989 Normalized to Zero
Control Group: Southeastern States



Graphed are the coefficients on the interaction of year dummies with the Georgia dummy. Coefficients are obtained from a single regression that includes the Georgia*year interactions as well as the state unemployment rate and dummies for year, age, race and urbanicity. Dependent variable is an indicator for college attendance.